

Serial No. 09/988,688

Attorney Docket No. 11-073-RCE

REMARKS

Claims 1-8, 10-13, 15, 17, 18, 20 and 22-32 were pending. Claims 3, 4, 24 and 25 are canceled herein. Thus, claims 1, 2, 5-8, 10-13, 15, 17, 18, 20 and 22, 23 and 26-32 are pending. The applicants respectfully request reconsideration and allowance of this application in view of the above amendments and the following remarks.

Claim 32 was rejected under 35 USC 112, second paragraph, as being allegedly indefinite. Without acknowledging the propriety of the rejection, claim 32 is amended herein to improve the clarity thereof and not for reasons related to patentability.

Claim 32 was rejected under 35 U.S.C. §112 second paragraph as being as being indefinite. Although the basis for the rejection is respectfully questioned in the comments below, claim 32 has been amended to improve the clarity thereof.

Claim 32 was rejected due primarily to an alleged lack of clarity. A rejection under section 112, second paragraph requires that A) claims set forth subject matter applicants regards as the invention; and B) claims particularly point out and distinctly claim the subject matter of the invention. Since A) relies on subjective interpretation, B) necessarily forms the objective basis for a rejection under this paragraph. Item B) requires an inquiry into the definiteness of the claim, e.g. whether the scope of the claim would be clear to a person of ordinary skill in the art (MPEP 2171) *within a reasonable degree of certainty*.

Applicants submit that since the claims would have been clear to one of ordinary skill in the art as written, an objection would have been a more appropriate means to address clarity issues. Since the phrase "the predetermined number decreased to increase the joint strength of the laser fused weld" refers to common usage for describing a relation, e.g. "decreasing the predetermined number increases the joint strength of the laser fused weld", the claim would be

Serial No. 09/988,688

Attorney Docket No. 11-073-RCE

clearly understandable to one of ordinary skill as referring not necessarily to a particular number of fused portions, but to such a relationship as described in applicants specification, for example, in the paragraph beginning on page 13, line 26 through page 14, line 17, where the large number of welds associated with the comparative samples illustrated in FIG. 14(a) – 14(c) are shown to promote a decrease in thermal conductivity. In contrast, in the described the embodiment, less welded portions minimize temperature rise and promote higher reliability of the joint. The relation between joint strength and the thermal consequences of the number of fused portions would be apparent by subsequent descriptions associated, for example, with FIG. 5. Thus, the rejection is improper under 35 U.S.C. §112 second paragraph.

Without acknowledging the propriety of the rejection, applicants have amended the claims to improve the clarity thereof. Accordingly claim 32 has been amended as to matters of form only to address the Examiner's concerns relating to clarity and not for reasons related to patentability. Thus the scope of claim 32 has not been narrowed within the meaning defined in *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 535 U.S. 722 (2002).

Further, since no new matter has been entered and since no new issues have been raised, claim 32 is amended to place it into better form for allowance.

Claims 1-3, 10, 15, 17 and 22 were rejected under 35 USC 103(a) as being unpatentable over McDougal, U.S. Patent No. 2,783,409 in view of Johnson, U.S. Patent No. 5,430,346 and further in view of Kanao DE 199 61 768 A 1. Claim 3 is canceled herein and will not be discussed. The applicants respectfully request that this rejection be withdrawn for the following reasons.

Applicants note that independent claim 1 has been amended herein to include the features of claims 3 and 4, that, for example, a depth of the weld between said ground electrode and said

Serial No. 09/988,688

Attorney Docket No. 11-073-RCE

metal shell is about 0.3 mm to 1.5 mm, and that the metal shell is made of an Fe-base alloy containing one of 0.15% by weight or less of S, 0.35% by weight or less of Si, 0.25% by weight or less of C, 1.5% by weight or less of Mn, and 0.1% by weight or less of P. Since existing features only have been included in claim 1 and corresponding claims canceled, the amendment raises no new issues and places the claims in better condition for allowance.

By way of review, the present invention aims, *inter alia*, to minimize manufacturing variations in the size of a spark gap that arises when a metal shell of a Fe-based alloy, such as carbon steel, is welded to the ground electrode thereby eliminating the need for adjusting of the spark gap after the welding operation and increasing factors such as uniformity, productivity, yield and the like. Advantages are achieved by laser-welding the metal shell to the ground electrode. The laser-welding of the present invention not only eliminates the pressing operation normally required by conventional techniques that use resistance welding, but provides additional structural features such as the claimed predetermined melt depth that provide control over factors such as spark gap size and joint strength.

The Examiner contends that laser welding is known to eliminate the need for pressing, which, in turn, prevents unfavorable deformation. Even if applicants concede *arguendo*, that laser welding is known to prevent deformation, the use of laser welding for attaching the ground electrode to the metal shell to minimize the size of the spark gap and eliminate the need for gap adjustment has not been known. Thus, the structure of the present invention to achieve additional benefits can be distinguished from prior art procedures and structures by solving additional problems that are not addressed, mentioned or even appreciated in the prior art.

For example, laser welding of the metal shell to the ground electrode can result in coagulation cracks or solidification caused breakages in the weld, leading to a decrease in joint strength. To avoid the decrease in strength, the structure of the present invention, e.g. the

Serial No. 09/988,688

Attorney Docket No. 11-073-RCE

claimed material composition, the claimed value of melt depth d , and the like of the laser weld, to avoid the problems that have not been identified in the art.

The Examiner contends that a melt depth would be inherent in any weld and a melt depth within the claimed range would be a matter of optimization of a workable range. Applicants note that because a prior art weld depth *may* fall within the claimed range but does not *necessarily* fall within the claimed range, basis for the assertion of inherency is insufficient under the reasoning established in In re Rijckaert, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993) (see, MPEP 2112 (IV)).

It is important to note that the teachings of Kanao are applied to justify a purported teaching in the art of general conditions that melt depth provides high tensile strength, however Kanao refers only to the attachment of a noble metal chip to a ground electrode and not to the claimed structure, e.g. a ground electrode connected to a metal shell as claimed. Since, as noted above, the attachment of the ground electrode to the metal shell poses unique problems not appreciated in the art, it would not have been a matter of routine skill to achieve the rather particular range discovered and claimed by applicants in the present application for attaching the ground electrode to the metal shell.

Accordingly, for at least the reasons set forth herein above, a *prima facie* case of obviousness cannot be sustained against independent claim 1, particularly as amended herein. It is respectfully requested therefore that the rejection of claim 1 be reconsidered and withdrawn.

Claims 2, 10, 15, 17 and 22, by virtue of depending from claim 1, are allowable for at least the reasons set forth herein above with regard to claim 1. It is requested therefore that the rejection of claims 2, 10, 15, 17 and 22 be reconsidered and withdrawn.

Serial No. 09/988,688

Attorney Docket No. 11-073-RCB

Claims 4 and 5 were rejected under 35 USC 103(a) as being unpatentable over McDougal, in view of Johnson and Kanao and further in view of Takafumi et al., JP 63-266046 ("Takafumi"). Claim 4 is canceled herein and will not be discussed. The applicants respectfully request that this rejection be withdrawn for the following reasons.

Claim 5, by virtue of depending from claim 1, is allowable for at least the reasons set forth herein above with regard to claim 1. It is requested therefore that the rejection of claim 5 be reconsidered and withdrawn.

Claim 6 was rejected under 35 USC 103(a) as being unpatentable over McDougal, in view of Johnson and Kanao and further in view of Pfeil, U.S. Patent No. 2,406,966. The applicants respectfully request that this rejection be withdrawn for the following reasons.

Claim 6, by virtue of depending from claim 1, is allowable for at least the reasons set forth herein above with regard to claim 1. It is requested therefore that the rejection of claim 6 be reconsidered and withdrawn.

Claims 7, 8, 13, 18 and 20 were rejected under 35 USC 103(a) as being unpatentable over McDougal, in view of Johnson and Kanao and further in view of Franks, U.S. Patent No. 3,958,144. The applicants respectfully request that this rejection be withdrawn for the following reasons.

Claims 7, 8, 13, 18 and 20, by virtue of depending from claim 1, are allowable for at least the reasons set forth herein above with regard to claim 1. It is requested therefore that the rejection of claims 7, 8, 13, 18 and 20 be reconsidered and withdrawn.

Claims 11 and 12 were rejected under 35 USC 103(a) as being unpatentable over McDougal, in view of Johnson and Kanao and Franks, and further in view of Takafumi. The applicants respectfully request that this rejection be withdrawn for the following reasons.

Serial No. 09/988,688

Attorney Docket No. 11-073-RCE

Claims 11 and 12, by virtue of depending from claim 1, are allowable for at least the reasons set forth herein above with regard to claim 1. It is requested therefore that the rejection of claims 11 and 12 be reconsidered and withdrawn.

Claims 23, 24, 27, 30, 31 and 32 were rejected under 35 USC 103(a) as being unpatentable over Pfeil in view of Johnson and further in view of Kanao. Claims 24 is canceled herein and will not be discussed. The applicants respectfully request that this rejection be withdrawn for the following reasons.

Applicants further note that independent claim 23 has been amended herein to include the features of claims 24 and 25, that, for example, the depth d of the weld between said ground electrode and said metal shell is between from about 0.3 mm to about 1.5 mm, and the metal shell is made of an Fe-base alloy containing one of 0.15% by weight or less of S, 0.35% by weight or less of Si, 0.25% by weight or less of C, 1.5% by weight or less of Mn, and 0.1% by weight or less of P. Since existing features only have been included in claim 23 and corresponding claims canceled, the amendment raises no new issues and places the claims in better condition for allowance.

As also noted above in connection with the rejection of claim 1, the present invention minimizes manufacturing variations in the size of a spark gap thereby eliminating the need for adjusting of the spark gap after a welding operation. Advantages are achieved by laser-welding the metal shell to the ground electrode. The laser-welding of the present invention not only eliminates the pressing operation normally required by conventional techniques that use resistance welding, but provides additional structural features such as the claimed predetermined melt depth that provide control over factors such as spark gap size and joint strength.

Serial No. 09/988,688

Attorney Docket No. 11-073-RCE

Even if applicants concede *arguendo*, that laser welding is known to prevent deformation, the use of laser welding for attaching the ground electrode to the metal shell to minimize the size of the spark gap and eliminate the need for gap adjustment has not been known. Thus, the structure of the present invention to achieve additional benefits can be distinguished from prior art procedures and structures by solving additional problems in the art that have remained undisclosed and not suggested.

As noted above, laser welding of the metal shell to the ground electrode can result in coagulation cracks or solidification caused breakages in the weld, leading to a decrease in joint strength. To avoid the decrease in strength, the structure of the present invention, e.g. the claimed material composition, the claimed value of melt depth d , and the like of the laser weld, to avoid the problems that have not been identified in the art.

The Examiner contends that a melt depth would be inherent in any weld and a melt depth within the claimed range would be a matter of optimization of a workable range. Applicants note that because a prior art weld depth *may* fall within the claimed range but does not *necessarily* fall within the claimed range, basis for the assertion of inherency is insufficient under the reasoning established in In re Rijckaert, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993) (see, MPEP 2112 (IV)).

It is important to note that the teachings of Kanao are applied to justify a purported teaching in the art of general conditions that melt depth provides high tensile strength, however Kanao refers only to the attachment of a noble metal chip to a ground electrode and not to the claimed structure, e.g. a ground electrode connected to a metal shell as claimed. Since, as noted above, the attachment of the ground electrode to the metal shell poses unique problems not appreciated in the art, it would not have been a matter of routine skill to achieve the rather

Serial No. 09/988,688

Attorney Docket No. 11-073-RCE

particular range discovered and claimed by applicants in the present application for attaching the ground electrode to the metal shell.

Accordingly, for at least the reasons set forth herein above, a *prima facie* case of obviousness cannot be sustained against independent claim 23, particularly as amended herein. It is respectfully requested therefore that the rejection of claim 23 be reconsidered and withdrawn.

Claims 27, 30, 31 and 32, by virtue of depending from claim 23, are allowable for at least the reasons set forth herein above with regard to claim 23. It is requested therefore that the rejection of claims 27, 30, 31 and 32 be reconsidered and withdrawn.

Claims 25 and 26 were rejected under 35 USC 103(a) as being unpatentable over Pfeil in view of Johnson and further in view of Takafumi. Claims 25 is canceled herein and will not be discussed. The applicants respectfully request that this rejection be withdrawn for the following reasons.

Claim 26, by virtue of depending from claim 22, is allowable for at least the reasons set forth herein above with regard to claim 1. It is requested therefore that the rejection of claim 26 be reconsidered and withdrawn.

Claims 28 and 29 were rejected under 35 USC 103(a) as being unpatentable over Pfeil in view of Johnson and further in view of Franks. The applicants respectfully request that this rejection be withdrawn for the following reasons.

Claims 28 and 29, by virtue of depending from claim 22, are allowable for at least the reasons set forth herein above with regard to claim 22. It is requested therefore that the rejection of claim 28 and 29 be reconsidered and withdrawn.

Serial No. 09/988,688

Attorney Docket No. 11-073-RCE

In view of the foregoing, the applicants submit that this application is in condition for allowance. A timely notice to that effect is respectfully requested. If questions relating to patentability remain, the examiner is invited to contact the undersigned by telephone.

If there are any problems with the payment of fees, please charge any underpayments and credit any overpayments to Deposit Account No. 50-1147.

Respectfully submitted,



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